Complete Summary

GUIDELINE TITLE

Expert Panel Report: guidelines for the diagnosis and management of asthma. Update on selected topics.

BIBLIOGRAPHIC SOURCE(S)

National Asthma Education and Prevention Program Expert Panel Report: guidelines for the diagnosis and management of asthma update on selected topics-2002. J Allergy Clin Immunol 2002 Nov;110(5 pt 2):S141-219.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Asthma

GUIDELINE CATEGORY

Assessment of Therapeutic Effectiveness
Evaluation
Management
Prevention
Treatment

CLINICAL SPECIALTY

Allergy and Immunology
Emergency Medicine
Family Practice
Internal Medicine
Pediatrics

Pharmacology
Preventive Medicine
Pulmonary Medicine

INTENDED USERS

Advanced Practice Nurses
Health Plans
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To present recommendations for the management of asthma that will help clinicians and patients make appropriate decisions about asthma care on the following topics:
    - Medications, including long-term management of asthma in children, combination therapy, and effect of antibiotics on acute exacerbations of asthma
    - Monitoring, including written action plans compared to medical management alone, and peak flow-based compared to symptom-based written action plans
    - Prevention, including effects of early treatment on the progression of asthma
- To revise the National Asthma Education and Prevention Program Expert Panel Report-2 Stepwise Approach for Managing Asthma in order to incorporate findings from the review of the scientific evidence

TARGET POPULATION

Infants, children, adolescents, and adults with asthma

INTERVENTIONS AND PRACTICES CONSIDERED

Treatment for Quick Relief

1. Medical history including history of wheezing (frequency/duration), risk factors for development of asthma, medication use and exposure to allergens
2. Physical examination including assessment of symptoms
    - Spirometry (peak expiratory flow [PEF]/forced expiratory volume in 1 second [FEV_1])
3. Classify severity of asthma exacerbation (severe, moderate, mild)
4. Medication
    - Short-acting $beta_2$-agonists (albuterol, bitolterol, pirbuterol, terbutaline, levalbuterol)
    - Anticholinergics (ipratropium bromide)
    - Systemic corticosteroids (methylprednisolone, prednisolone, prednisone)
5. Patient/Parent education including medications, proper use of delivery device, environmental factors contributing to asthma

Management/Prevention of Chronic Asthma

1. Classify severity
2. Stepwise approach
3. Medication
    - Inhaled corticosteroids (ICS), such as beclomethasone dipropionate, budesonide, flunisolide, fluticasone propionate, triamcinolone acetonide
    - Systemic corticosteroids (methylprednisolone, prednisolone, prednisone)
    - Long-acting beta$_2$-agonists (salmeterol, formoterol)
    - Combined medication: fluticasone/salmeterol
    - Cromolyn, nedocromil
    - Leukotriene receptor antagonists (montelukast, zafirlukast, zileuton)
    - Methylxanthines (theophylline)
    - Note: antibiotics are considered but not routinely recommended
4. Patient/Parent education
    - Written asthma plan
    - Peak flow monitoring
5. Referral to asthma specialist

MAJOR OUTCOMES CONSIDERED

- Lung function measurements
    - Forced expiratory volume in one second (FEV_1)
    - Peak expiratory flow (PEF)
- Symptom control as indicated by:
    - Symptom scores
    - Symptom frequency
    - Use of acute bronchodilator medication
    - Exacerbations
    - Use of oral corticosteroids
- Utilization measures
    - Emergency room visits
    - Unscheduled physician visits
    - Hospitalizations
    - Days lost from school or work
- Adverse effects of treatment
    - Long-term inhaled corticosteroid therapy in children: Vertical growth, bone mineral density, ocular toxicity, and suppression of adrenal/pituitary axis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

An Agency for Healthcare Research and Quality (AHRQ) Evidence-Based Practice Center performed a comprehensive review of the literature on each of the selected topics; prepared evidence tables depicting study design, research variables, and reported outcomes; and summarized the literature findings in a narrative report.

The literature search included full-length reports published in peer-reviewed medical journals and articles in English or published in foreign languages with English abstracts. Studies that did not include control groups in the research design were excluded from review (except for those that dealt with the topic of adverse effects of inhaled corticosteroids), and most of the included trials were randomized. Specific criteria that defined patient populations of interest, outcomes of interest, types of interventions, and study design were established for each topic. A comprehensive literature search was performed using key text words and MeSH terms (Medical Subject Heading) to identify all relevant controlled clinical trials. (Key words included, for example, all long-term-control asthma medications, antibiotics in asthma, peak expiratory flow rate meter, action plan, and self-care monitoring.) Both the MEDLINE and EMBASE databases were searched for all articles published from 1980 through August 2000. In addition, the search included potentially relevant studies published before 1980 but referenced in the post-1980 literature.

The initial literature search retrieved 4,235 English and 343 non-English language references. One member of the Evidence-Based Practice Center´s study team reviewed abstracts; a second team member reviewed any excluded abstracts. On the basis of this abstract review, 668 full-length journal articles were retrieved and rated independently by two study team members against study selection criteria. Eighty-seven articles met the study selection criteria to be included in the systematic review of the evidence (SRE).

The Expert Panel noted that, for some topics, significant studies had been published in the 7-month period between the Evidence-Based Practice Center's search of the literature and submission of its report. The Expert Panel agreed that the writing committees would include their own review of additional literature published since August 2000 and use MEDLINE searches as appropriate.

NUMBER OF SOURCE DOCUMENTS

668 full-length articles were reviewed, yielding 87 source documents

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

The source and level of the evidence used to support recommendations are noted in parentheses following the recommendation. If the source of the evidence is from the Evidence-Based Practice Center Systematic Review of the Evidence

(SRE), the category is preceded by the notation "SRE"; if the source is the Expert Panel's additional literature, there is no prefix.

Evidence Category A: Randomized controlled trials (RCTs), rich body of data. Evidence is from end points of well-designed RCTs that provide a consistent pattern of findings in the population for which the recommendation is made. Category A requires substantial numbers of studies involving substantial numbers of participants.

Evidence Category B: RCTs, limited body of data. Evidence is from end points of intervention studies that include only a limited number of patients, post hoc or subgroup analysis of RCTs, or meta-analysis of RCTs. In general, Category B pertains when few randomized trials exist, they are small in size, they were undertaken in a population that differs from the target population of the recommendation, or the results are somewhat inconsistent.

Evidence Category C: Nonrandomized trials and observational studies. Evidence is from outcomes of uncontrolled or nonrandomized trials or from observational studies.

Evidence Category D: Panel Consensus Judgment. This category is used only in cases where the provision of some guidance was deemed valuable, but the clinical literature addressing the subject was insufficient to justify placement in one of the other categories. The Panel consensus is based on clinical experience or knowledge that does not meet the criteria for categories A through C.

METHODS USED TO ANALYZE THE EVIDENCE

Meta-Analysis of Randomized Controlled Trials
Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Data from the 87 articles meeting study selection criteria were abstracted for evidence tables by two reviewers and were recorded in an electronic database. Data elements included categories such as study design and methods, patient characteristics, lung function outcomes, symptom outcomes, medication outcomes, utilization outcomes, and adverse events.

A quality assessment of the studies was performed to enable sensitivity analysis comparing the results and conclusions reached from all included studies with the results and conclusions of a subgroup of higher quality studies. Quality was assessed on three domains: concealment of treatment allocation during randomization, double-blinding, and handling of withdrawals and exclusions. Quality also was assessed on domains deemed pertinent to asthma research, such as establishing reversibility of airway obstruction, controlling for other medication use, reporting compliance, addressing seasonality, and a priori reporting of power calculations.

A meta-analysis was performed to assess the benefits of adding long-acting inhaled beta$_2$-agonist medication to inhaled corticosteroids as treatment of moderate persistent asthma.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The Expert Panel prepared draft position statements in its respective writing committees during summer and fall 2001, and the drafts were edited during the winter. A series of drafts were discussed in three telephone conference calls (June 2001, October 2001, and February 2002) among the full Panel membership. Final agreement on each position statement was reached during these calls, including the specific recommendations within the position statements to either retain or revise Expert Panel Report-2 (EPR-2). A vote confirmed the unanimous agreement of the Panel.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

A draft of the Expert Panel's position statements was mailed to the National Asthma Education and Prevention Program (NAEPP) Coordinating Committee members for their review, comment, and approval. The Expert Panel reviewed the Coordinating Committee´s suggested edits by e-mail and by telephone conference call and incorporated suggestions that were within the scope of the Coordinating Committee´s approval. Expert Panel members´ agreement on the final text was unanimous.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

NOTE from the National Guideline Clearinghouse (NGC) and the National Asthma Education and Prevention Program (NAEPP): The updated guideline provides timely information on five selected priority asthma topics. It was

developed using a new approach, focusing on a few of the more pressing asthma issues rather than updating all topics of the NAEPP Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma (EPR-2) at once. This NGC Summary presents only the updated topics, and is derived primarily from the Quick Reference of the NAEPP Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma--Update on Selected Topics 2002 (see also the Companion Documents field of this summary). Users are directed to the full-text guideline for additional details. Recommendations for the remaining topics not updated in the current release of the guideline are contained in the Web-based version of the Expert Panel Report 2 available on the National Heart, Lung, and Blood Institute (NHLBI) Web site.

In the 2002 release of the guideline, the National Asthma Education and Prevention Program (NAEPP) Expert Panel identified key questions about asthma management and makes the following recommendations.

Medications

Long-Term Management of Asthma in Children

Question: Does chronic use of inhaled corticosteroids improve long-term outcomes for children with mild or moderate persistent asthma, compared to other asthma medications?

Answer: Strong evidence from clinical trials has established that inhaled corticosteroids improve control of asthma for children with mild or moderate persistent asthma compared to as-needed beta$_2$-agonists, as measured by prebronchodilator forced expiratory volume in one second (FEV_1), reduced airway hyperresponsiveness, improvements in symptom scores and symptom frequency, fewer courses of oral corticosteroids, and fewer urgent care visits or hospitalizations. Studies comparing inhaled corticosteroids to cromolyn, nedocromil, theophylline, or leukotriene receptor antagonists are limited, but available evidence shows that none of these long-term control medications appear to be as effective as inhaled corticosteroids in improving asthma outcomes. Studies comparing medications in children younger than 5 years of age are not available; recommendations are based on expert opinion and extrapolation from studies in older children. The NAEPP EPR-2 recommendations for treating children with mild or moderate persistent asthma have been revised. (See charts for Stepwise Approach for Managing Asthma, below.)

Based on observational studies, it is the opinion of the Expert Panel that the initiation of long-term control therapy should be considered in infants and young children who have had more than three episodes of wheezing in the past year that lasted more than 1 day and affected sleep and who have risk factors for the development of asthma (parental history of asthma or physician-diagnosed atopic dermatitis or two of the following: physician-diagnosed allergic rhinitis, wheezing apart from colds, peripheral blood eosinophilia). This is in addition to previously recommended indications for starting long-term control therapy--i.e., in infants and young children requiring symptomatic treatment more than two times per week or experiencing severe exacerbations less than 6 weeks apart.

Refer to the original guideline document for additional details.

Question: What are the long-term adverse effects of chronic inhaled corticosteroid use in children on the following outcomes: vertical growth, bone mineral density, ocular toxicity, and suppression of the hypothalamic-pituitary-adrenal (HPA) axis?

Answer: Strong evidence from clinical trials following children for up to 6 years shows that the use of inhaled corticosteroids at recommended doses does not have frequent, clinically significant, or irreversible effects on any of the outcomes reviewed. The NAEPP EPR-2 statements have been updated but not changed: Inhaled corticosteroids improve health outcomes for children with mild or moderate persistent asthma, and the potential but small risk of delayed growth is well balanced by their effectiveness.

Cumulative data in children suggest that low-to-medium doses of inhaled corticosteroids may have the potential of decreasing growth velocity (resulting in a small difference in height averaging 1 cm in the first year of treatment), but this effect on growth velocity is not sustained in subsequent years of treatment, is not progressive, and may be reversible. Cohort studies following children for more than 10 years suggest that final height is attained. Physicians should monitor the growth of children and adolescents taking corticosteroids by any route of administration and, if growth appears slowed, weigh the benefits of asthma control against the possibility of growth suppression or delay.

Studies including 6 years of observation indicate that low-to-medium doses of inhaled corticosteroids have no adverse effects on bone mineral density in children and no significant effects on the incidence of subcapsular cataracts or glaucoma. Studies show that, on average, persons may have only clinically insignificant effects, if any, of inhaled corticosteroids on hypothalamic-pituitary-adrenal axis function, although there may be rare individuals who are more susceptible.

Refer to the original guideline document for additional details.

Combination Therapy

Question: In patients with moderate persistent asthma who are receiving inhaled corticosteroids, does addition of another long-term control agent improve outcomes?

Answer: Strong evidence from clinical trials consistently indicates that use of long-acting inhaled $beta_2$-agonists added to low-to-medium doses of inhaled corticosteroids leads to improvements in lung function and symptoms and reduced need for quick relief, short-acting $beta_2$-agonists. Adding a leukotriene modifier or theophylline to inhaled corticosteroids or doubling the dose of inhaled corticosteroids also improves outcomes, but the evidence is not as substantial. The NAEPP EPR-2 recommendations for moderate persistent asthma have been revised: The preferred treatment for adults and children over 5 years of age is the addition of long-acting inhaled $beta_2$-agonists to low-to-medium doses of inhaled corticosteroids. Adjunctive therapy combinations have not been studied in children younger than 5 years of age. For this age group, it is the opinion of the Expert Panel that there are two preferred options for treating moderate asthma: either the addition of long-acting inhaled $beta_2$-agonists to a low dose of inhaled corticosteroids or medium-dose inhaled corticosteroids as monotherapy.

Refer to the original guideline document for additional details.

Use of Antibiotics To Treat Acute Asthma Exacerbation

Question: Does adding antibiotics to standard care improve the outcomes of treatment for acute exacerbation of asthma?

Answer: Evidence from clinical trials suggests no benefit from antibiotic therapy for asthma exacerbations, whether administered routinely or when suspicion of bacterial infection is low. No studies have addressed the question of whether the addition of antibiotics to standard care improves the outcomes of treatment for asthma exacerbations when signs and symptoms suggest the possibility--but do not clearly indicate the presence--of bacterial infection. The NAEPP EPR-2 recommendation has not been changed: Antibiotics are not recommended for the treatment of acute asthma exacerbations except as needed for comorbid conditions--e.g., for those patients with fever and purulent sputum, evidence of pneumonia, or suspected bacterial sinusitis.

Refer to the original guideline document for additional details.

Monitoring

Written Action Plans Compared to Medical Management Alone

Question: Compared to medical management alone, does the use of a written asthma action plan improve outcomes?

Answer: Data are insufficient to support or refute the benefits of using written asthma action plans compared to medical management alone. Seven studies compared medical management with written action plans to medical management without action plans. Beyond including instructions on the action plan to the intervention groups, four of these studies did not include asthma education for either the intervention or control groups; three of the studies included similar but limited asthma education for both intervention and control groups. Only one study included children. Significant limitations in study designs and methods in these studies preclude conclusions. For example, the studies showing no benefits of written action plans did not have sufficient power for comparisons between treatment and control groups, and the two studies reporting significant improvements with action plans had potential biases in patient selection, withdrawals, data collection, or analysis.

However, a Cochrane review of 25 studies comparing asthma self-management education interventions for adults to medical care without such education also contrasted those studies with self-management interventions that included written action plans to those that did not. The self-management interventions with written action plans had the greatest benefits, including reduced emergency department visits and hospitalizations and improved lung function.

The NAEPP EPR-2 recommendations have not been changed: It is the opinion of the Expert Panel that use of written action plans as part of an overall effort to educate patients in self-management is recommended, especially for patients with

moderate or severe persistent asthma and patients with a history of severe exacerbations.

Refer to the original guideline document for additional details.

Peak Flow-Based Compared to Symptom-Based Written Action Plans

Question: Compared to a written action plan based on symptoms, does use of a written action plan based on peak flow monitoring improve outcomes?

Answer: Evidence neither supports nor refutes the benefits of written action plans based on peak flow monitoring compared to symptom-based plans in improving health care utilization, symptoms, or lung function. Just four studies, one including children, were available, and these studies had limitations (e.g., inadequate sample sizes and power to detect differences or potential bias in patient selection). The evidence does not clearly show that a peak flow-based action plan is better, but equivalent benefits have been demonstrated. Patient preferences and circumstances (e.g., inability to recognize or report signs and symptoms of worsening asthma) may warrant choosing peak flow monitoring. The NAEPP EPR-2 recommendations have not been changed. It is the opinion of the Expert Panel that peak flow monitoring for patients with moderate or severe persistent asthma should be considered because it may enhance clinician-patient communication and may increase patient and caregiver awareness of the disease status and control.

Refer to the original guideline document for additional details.

Prevention

Effects of Early Treatment on Progression of Asthma

Question: For patients with mild or moderate persistent asthma, does early intervention with long-term control therapy (i.e., inhaled corticosteroids) prevent progression of asthma as indicated by changes in lung function or severity of symptoms?

Answer: Evidence is insufficient to permit conclusions on the benefits of early treatment of asthma in preventing the progression of disease. The NAEPP EPR-2 statements on disease progression have been revised. The assumption that children ages 5 to 12 with mild or moderate persistent asthma have a progressive decline in lung function has not been supported by a large, randomized, controlled clinical trial. The trial found that although inhaled corticosteroids provided superior asthma control during treatment, symptoms and airway hyperresponsiveness returned when treatment was discontinued. This suggests that, for this age group, treatment provides control but does not modify the underlying disease process. In contrast, prospective observational studies in other age groups suggest that a loss of lung function in children occurs in the first 3 to 5 years of life and can occur rapidly in adults with asthma. Adequate studies of whether treatment can prevent these declines in lung function have not yet been conducted.

Refer to the original guideline document for additional details.

Stepwise Approach for Managing Asthma

Goals of Therapy: Asthma Control

- Minimal or no chronic symptoms day or night
- Minimal or no exacerbations
- No limitations on activities; no school/parent's or patient's work missed
- Maintain (near) normal pulmonary function (adults and children older than 5 years of age)
- Minimal use of short-acting inhaled $beta_2$-agonist (<1x per day, < 1 canister/month)
- Minimal or no adverse effects from medications

Stepwise Approach for Managing Infants and Young Children (5 Years of Age and Younger) With Acute or Chronic Asthma

Classify Severity: Clinical Features Before Treatment or Adequate Control		Medications Required to Maintain Long-Term Control
	Symptoms/Day Symptoms/Night	Daily Medications
STEP 4 Severe Persistent	Continual Frequent	Preferred Treatment: High-dose inhaled corticosteroids AND Long-acting inhaled $beta_2$-agonists AND, if needed, Corticosteroid tablets or syrup long term (2 mg/kg/day, generally do not exceed 60 mg per day). (Make repeat attempts to reduce systemic corticosteroids and maintain control with high-dose inhaled corticosteroids.)
STEP 3 Moderate Persistent	Daily >1 night/week	Preferred Treatment: Low-dose inhaled corticosteroids and long-acting inhaled $beta_2$-agonists OR

Classify Severity: Clinical Features Before Treatment or Adequate Control		Medications Required to Maintain Long-Term Control
	Symptoms/Day Symptoms/Night	Daily Medications
		Medium-dose inhaled corticosteroids Alternative Treatment: Low-dose inhaled corticosteroids and either leukotriene receptor antagonist or theophylline If needed (particularly in patients with recurring severe exacerbations): Preferred Treatment: Medium-dose inhaled corticosteroids and long-acting inhaled $beta_2$-agonists Alternative Treatment: Medium-dose inhaled corticosteroids and either a leukotriene receptor antagonist or theophylline
STEP 2 Mild Persistent	> 2/week but < 1x/day >2 nights/month	Preferred Treatment: Low-dose inhaled corticosteroid (with nebulizer or metered-dose inhaler [MDI] with holding chamber with or without face mask or dry powder inhaler [DPI]) Alternative Treatment (listed alphabetically): Cromolyn (nebulizer is preferred or MDI with holding chamber) OR leukotriene receptor antagonist
STEP 1 Mild Intermittent	Less than or equal to 2 days/week Less than or equal to 2 nights/month	No daily medication needed

Classify Severity: Clinical Features Before Treatment or Adequate Control		Medications Required to Maintain Long-Term Control
	Symptoms/Day Symptoms/Night	Daily Medications
Step down: Review treatment every 1 to 6 months; a gradual stepwise reduction in treatment may be possible.		Step up: If control is not maintained, consider step up. First, review patient medication technique, adherence, and environmental control.

Quick Relief:

- Bronchodilator as needed for symptoms. Intensity of treatment will depend on severity of exacerbation.
    - Preferred treatment: Short-acting inhaled beta$_2$-agonists by nebulizer or face mask and space/holding chamber
    - Alternative treatment: Oral beta$_2$-agonist
- With viral respiratory infection
    - Bronchodilator every 4-6 hours up to 24 hours (longer with physician consult); in general, repeat no more than once every 6 weeks
    - Consider systemic corticosteroid if exacerbation is severe or patient has history of previous severe exacerbations
- Use of short-acting beta$_2$-agonists >2 times a week in intermittent asthma (daily, or increasing use in persistent asthma) may indicate the need to initiate (increase) long-term control therapy.

Notes on the Stepwise Approach

- The stepwise approach is intended to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- Classify severity: assign patient to most severe step in which any feature occurs.
- There are very few studies on asthma therapy for infants.
- Gain control as quickly as possible (a short course of systemic corticosteroids may be required); then step down to the least medication necessary to maintain control.
- Minimize use of short-acting inhaled beta$_2$-agonists. Over-reliance on short-acting inhaled beta$_2$-agonists (e.g., use of short-acting inhaled beta$_2$-agonists every day, increasing use or lack of expected effect, or use of approximately one canister a month even if not using it every day) indicates inadequate control of asthma and the need to initiate or intensify long-term-control therapy.
- Provide parent education on asthma management and controlling environmental factors that make asthma worse (e.g., allergies and irritants)
- Consultation with an asthma specialist is recommended for patients with moderate or severe persistent asthma. Consider consultation for patients with mild persistent asthma.

Stepwise Approach for Managing Asthma in Adults and Children Older Than 5 Years of Age: Treatment

Classify Severity: Clinical Features Before Treatment or Adequate Control			Medications Required to Maintain Long-Term Control
	Symptoms/Day Symptoms/Night	PEF or FEV_1 PEF Variability	Daily Medications
STEP 4 Severe Persistent	Continual Frequent	Less than or equal to 60% > 30%	Preferred Treatment: High-dose inhaled corticosteroids AND Long-acting inhaled $beta_2$-agonists AND, if needed: Corticosteroid tablets or syrup long term (2 mg/kg/day, generally do not exceed 60 mg per day).(Make repeat attempts to reduce systemic corticosteroids and maintain control with high-dose inhaled corticosteroids.)
STEP 3 Moderate Persistent	Daily >1 night/week	> 60% to < 80% > 30%	Preferred Treatment: Low-to-medium dose inhaled corticosteroids and long-acting inhaled $beta_2$-agonists Alternative Treatment (listed alphabetically): Increase inhaled corticosteroids within medium-dose range OR Low-to-medium dose

Classify Severity: Clinical Features Before Treatment or Adequate Control			Medications Required to Maintain Long-Term Control
	Symptoms/Day Symptoms/Night	PEF or FEV_1 PEF Variability	Daily Medications
			inhaled corticosteroids and either leukotriene modifier or theophylline. --- If needed (particularly in patients with recurring severe exacerbations): Preferred Treatment: Increase inhaled corticosteroids within medium-dose range and add long-acting inhaled $beta_2$-agonists Alternative Treatment: Increase inhaled corticosteroids within medium-dose range and add either a leukotriene modifier or theophylline
STEP 2 Mild Persistent	>2/week but <1x/day >2 nights/month	Greater than or equal to 80% 20-30%	Preferred Treatment: Low-dose inhaled corticosteroids Alternative Treatment (listed alphabetically): cromolyn, leukotriene modifier, nedocromil, OR sustained release theophylline to serum concentration of 5-15 mcg/mL

Classify Severity: Clinical Features Before Treatment or Adequate Control			Medications Required to Maintain Long-Term Control
	Symptoms/Day Symptoms/Night	PEF or FEV_1 PEF Variability	Daily Medications
STEP 1 Mild Intermittent	Less than or equal to 2 days/week Less than or equal to 2 nights/month	Greater than or equal to 80% < 20%	No daily medication needed Severe exacerbations may occur, separated by long periods of normal lung function and no symptoms. A course of systemic corticosteroids is recommended.
Step down: Review treatment every 1 to 6 months; a gradual stepwise reduction in treatment may be possible.		Step up: If control is not maintained, consider step up. First, review patient medication technique, adherence, and environmental control.	

Quick Relief: All Patients

- Short-acting bronchodilator: 2-4 puffs short-acting inhaled $beta_2$-agonists as needed for symptoms.
- Intensity of treatment will depend on severity of exacerbation; up to 3 treatments at 20-minute intervals or a single nebulizer treatment as needed. Course of systemic corticosteroids may be needed.
- Use of short-acting $beta_2$-agonists > 2 times a week in intermittent asthma (daily, or increasing use in persistent asthma) may indicate the need to initiate (increase) long-term control therapy.

Notes on the Stepwise Approach

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- Classify severity: assign patient to most severe step in which any feature occurs (peak expiratory flow [PEF] is % of personal best; forced expiratory volume in one second [FEV_1] is % predicted).
- Gain control as quickly as possible (consider a short course of systemic corticosteroids); then step down to the least medication necessary to maintain control.
- Minimize use of short-acting inhaled $beta_2$-agonists. Over-reliance on short-acting inhaled $beta_2$-agonists (e.g., use of short-acting inhaled $beta_2$-agonists every day, increasing use or lack of expected effect, or use of approximately one canister a month even if not using it every day) indicates inadequate control of asthma and the need to initiate or intensify long-term-control therapy.
- Provide education on self-management and controlling environmental factors that make asthma worse (e.g., allergens and irritants).

- Refer to an asthma specialist if there are difficulties controlling asthma or if step 4 care is required. Referral may be considered if step 3 care is required.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded (in the original guideline document) for each recommendation.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Effective medical management of asthma for patients and their families, including:

- Improved lung function
- Reduced use of medications
- Increased self-management and quality of life for patients and their families
- Reduced use of health care services/interventions

Subgroups Most Likely to Benefit:

Patients with moderate-to-severe asthma and patients with a history of severe exacerbations may especially benefit from asthma action plans.

POTENTIAL HARMS

Detailed medication interactions and adverse effects are provided in the 1997 Expert Panel Report-2 (EPR-2). Updated information from the 2002 publication of selected EPR-2 topics on the adverse effects of chronic inhaled corticosteroid use in children are as follows:

Strong evidence from clinical trials following children for up to 6 years shows that the use of inhaled corticosteroids at recommended doses does not have frequent, clinically significant, or irreversible effects on any of the outcomes reviewed. The NAEPP EPR-2 statements have been updated but not changed: Inhaled corticosteroids improve health outcomes for children with mild or moderate persistent asthma, and the potential but small risk of delayed growth is well balanced by their effectiveness.

Cumulative data in children suggest that low-to-medium doses of inhaled corticosteroids may have the potential of decreasing growth velocity (resulting in a small difference in height averaging 1 cm in the first year of treatment), but this effect on growth velocity is not sustained in subsequent years of treatment, is not progressive, and may be reversible. Cohort studies following children for more

than 10 years suggest that final height is attained. Physicians should monitor the growth of children and adolescents taking corticosteroids by any route of administration and, if growth appears slowed, weigh the benefits of asthma control against the possibility of growth suppression or delay.

Studies including 6 years of observation indicate that low-to-medium doses of inhaled corticosteroids have no adverse effects on bone mineral density in children and no significant effects on the incidence of subcapsular cataracts or glaucoma. Studies show that, on average, persons may have only clinically insignificant effects, if any, of inhaled corticosteroids on hypothalamic-pituitary-adrenal (HPA) axis function, although there may be rare individuals who are more susceptible.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- These guidelines are intended to inform, not replace, clinical judgment. Of course, the clinician and patient need to develop individual treatment plans that are tailored to the specific needs and circumstances of the patient.
- Although high doses of inhaled corticosteroids theoretically present risks similar to those of systemic corticosteroids, the reports of disseminated varicella in patients receiving only inhaled corticosteroids are rare, causality is not clear, and there is no evidence that recommended doses of inhaled corticosteroids are immunosuppressive.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness
Safety

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

National Asthma Education and Prevention Program Expert Panel Report: guidelines for the diagnosis and management of asthma update on selected topics-2002. J Allergy Clin Immunol 2002 Nov;110(5 pt 2):S141-219.

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1997 (revised 2002 Nov)

GUIDELINE DEVELOPER(S)

National Asthma Education and Prevention Program - Federal Government Agency [U.S.]
National Heart, Lung, and Blood Institute (U.S.) - Federal Government Agency [U.S.]

GUIDELINE DEVELOPER COMMENT

The National Asthma Education and Prevention Program Science Base Committee is a multidisciplinary group of clinicians and scientists with expertise in asthma management. The group includes health professionals in the areas of general medicine, family practice, pediatrics, emergency and critical care, allergy, pulmonary medicine, pharmacy, and health education.

SOURCE(S) OF FUNDING

The development of this report was entirely funded by the National Heart, Lung, and Blood Institute, National Institutes of Health.

GUIDELINE COMMITTEE

National Asthma Education and Prevention Program (NAEPP) Science Base Committee and Expert Panel on the Management of Asthma

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Expert Panel members disclosed relevant financial interests to each other prior to their deliberations. Expert Panel members and reviewers participated as volunteers and were compensated only for travel expenses related to the Expert Panel meeting.

ENDORSER(S)

Agency for Healthcare Research and Quality - Federal Government Agency [U.S.]
Allergy and Asthma Network/Mothers of Asthmatics, Inc - Private Nonprofit Organization
American Academy of Allergy, Asthma and Immunology - Medical Specialty Society
American Academy of Pediatrics - Medical Specialty Society
American Academy of Physician Assistants - Professional Association
American Association for Respiratory Care - Professional Association
American Association of Occupational Health Nurses - Professional Association
American College of Allergy, Asthma and Immunology - Medical Specialty Society
American College of Chest Physicians - Medical Specialty Society
American College of Emergency Physicians - Medical Specialty Society
American Lung Association - Disease Specific Society
American Medical Association - Medical Specialty Society
American Nurses Association - Professional Association
American Pharmacists Association - Professional Association
American Public Health Association - Professional Association
American School Health Association - Professional Association
American Society of Health-System Pharmacists - Professional Association
American Thoracic Society - Medical Specialty Society
Association of State and Territorial Directors of Health Promotion and Public Health Education - Professional Association
Asthma and Allergy Foundation of America - Private Nonprofit Organization
Centers for Disease Control and Prevention - Federal Government Agency [U.S.]
Environmental Protection Agency - Federal Government Agency [U.S.]
Food and Drug Administration (U.S.) - Federal Government Agency [U.S.]
National Association of School Nurses - Professional Association
National Black Nurses Association, Inc - Professional Association
National Center for Environmental Health - Federal Government Agency [U.S.]
National Center for Health Statistics, Centers for Disease Control and Prevention - Federal Government Agency [U.S.]
National Institute for Occupational Safety and Health
National Institute of Environmental Health Sciences - Federal Government Agency [U.S.]
National Institutes for Allergy and Infectious Diseases (U.S.) - Federal Government Agency [U.S.]
National Medical Association - Professional Association
NHLBI Ad Hoc Committee on Minority Populations
Public Health Service (U.S.) - Federal Government Agency [U.S.]
Society for Public Health Education - Professional Association

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Expert Panel Report 2: guidelines for the diagnosis and management of asthma. Bethesda (MD): U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute; 1997 Jul. 146 p.

GUIDELINE AVAILABILITY

Electronic copies: Available for download from the National Heart, Lung, and Blood Institute Web site.

Also available from the Journal of Allergy and Clinical Immunology Online.

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: nhlbiic@dgsys.com.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Expert Panel Report 2: guidelines for the diagnosis and management of asthma. Bethesda (MD): U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute; 1997 Jul. 146 p.

  Electronic copies available from the NHLBI Web site.

  Print copies available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: nhlbiic@dgsys.com

- Management of chronic asthma. Rockville, MD: Agency for Healthcare Research and Quality. (Evidence Report/Technology Assessment; no. 44).

  Electronic copies and further information regarding the availability of print copies is available from the Agency for Healthcare Research and Quality (AHRQ) Web site.

The following additional resources are also available:

- Quick reference of the NAEPP Expert Panel report: guidelines for the diagnosis and management of asthma--update on selcted topics 2002. Bethesda (MD): U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute; 2002. 6 p.

  Electronic copies available from the NHLBI Web site.

- Practical guide for the diagnosis and management of asthma. Bethesda (MD): U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute; 1997. 60 p.

  Electronic copies available from the NHLBI Web site.

- Asthma Treatment Guidelines for the Palm OS. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute, 2002. [online file].

  Available from the NHLBI Web site.

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: nhlbiic@dgsys.com.

PATIENT RESOURCES

The following is available:

- Facts about controlling your asthma. Patient education brochure. Bethesda, MD: NHLBI, 1997. 8 pages. [English and Spanish language versions are available.]

Electronic copies: Available from the National Heart, Lung and Blood Institute Web site.

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: nhlbiic@dgsys.com.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC STATUS

This summary was completed by ECRI on January 5, 1999. The information was verified by the guideline developer on April 30, 1999. This summary was updated by ECRI on January 31, 2003. This information was not verified by the guideline developer.

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Date Modified: 11/15/2004